



Winter Energy Appraisal

Winter Outlook 2022-2023

In compliance with MCL 460.6r

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MPSC Staff



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Glossary

Barrel	A unit of volume equal to 42 U.S. gallons.
b/d	The abbreviation for barrel(s) per day, also displayed as bbl/d.
Bcf	The abbreviation for billion cubic feet.
Brent	Brent is a major trading classification of sweet light crude oil that serves as a major benchmark price for purchases of oil worldwide.
CDD	Cooling Degree Days - a measure of how warm a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit. Cooling degree days are used in energy analysis as an indicator of air conditioning energy requirements or use.
EIA	Energy Information Administration - the statistical and analytical agency within the U.S. Department of Energy.
GWh	One billion watthours.
GCR	Gas Cost Recovery - the actual cost of natural gas that a local distribution company pays to purchase natural gas for your use.
HDD	Heating Degree Days - a measurement designed to quantify the demand for energy needed to heat a building. A measure of how cold a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit.
LSE	Load serving entity - a cooperative, municipal, investor-owned utility, or an alternative electric supplier (AES) that provides electricity to its customers.
Mcf	One thousand cubic feet.
MISO	Midcontinent Independent System Operator –a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 16 states and one Canadian province.
mmBtu	One million British thermal units.
MW	One million watts of electricity.
OECD	Organization for Economic Cooperation and Development - an intergovernmental economic organization with 35 member countries, founded in 1961 to stimulate economic progress and world trade.
OPEC	Organization of the Petroleum Exporting Countries
PJM	PJM – an RTO that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.
STEO	Short-Term Energy Outlook published monthly by EIA.
WTI	West Texas Intermediate (also known as Texas light sweet) – a grade of crude oil used as a benchmark in oil pricing.

Preface

The Michigan Energy Appraisal is a semiannual assessment of Michigan’s energy baseline. The assessment raises the situational awareness of the state’s energy environment including recent events impacting supply and prices, expected conditions, and changes over the next six months. Additionally, it provides the necessary information to enable a reliable assessment of the risk posed by an energy supply disruption.

After several publications of the Energy Appraisal which focused on the impacts of COVID-19 and the uncertainties for Michigan’s energy systems, this winter’s edition returns to providing short-term outlooks for select energy supply and demand dynamics. Due to data availability issues, Michigan-specific outlooks for petroleum energy sources (propane, distillates, and gasoline) are unavailable for this edition. However, these energy sources are still discussed in a broader context.

Although COVID-19 still poses a risk to Michigan residents, there are signs of economic recovery and the return to more historical consumption patterns for energy products.

This report is prepared by the Energy Security Section of the Michigan Public Service Commission (MPSC) with assistance from the Energy Operations, Energy Resources, and Regulated Energy Divisions of the MPSC, Department of Licensing and Regulatory Affairs (LARA), State of Michigan.

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A major source of data and analysis used in this appraisal is the federal Energy Information Administration (EIA) at <http://www.eia.doe.gov>. The EIA collects national, state, and international data on energy usage, prices, supply, etc., and provides expert analysis on trends in energy.

Comments or questions on this appraisal are welcomed and may be directed to Alex Morese, Michigan Public Service Commission, at moresea@michigan.gov.

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Executive Summary

Energy use in Michigan is closely tied to economic activity within the state. Motorists use gasoline to travel to and from work, companies move goods throughout the state by trucks and trains powered by diesel fuel, the industrial sector uses natural gas as a fuel for their manufacturing processes, and all sectors use electricity to light either their homes, businesses, or factories. Of particular note for this Energy Appraisal is the current price volatility within energy markets and the uncertainty surrounding future price projections. The EIA geographically aggregates price projections into Petroleum Administration Defense Districts (PADDs) – which means prices in individual states may eclipse the regional PADD average for a given forecast period.

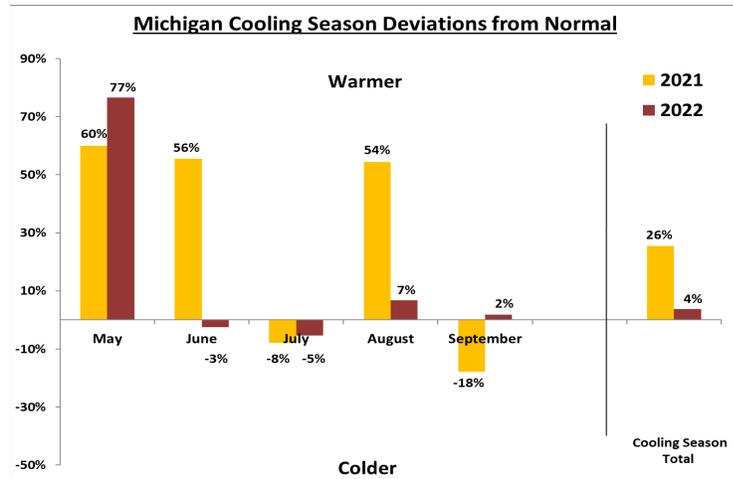
The core analyses in this winter's edition of the Michigan Energy Appraisal were compiled by Staff at the Michigan Public Service Commission and projections sourced from the federal Energy Information Administration.

Some key report findings for Michigan energy sectors:

- Consumption of **natural gas** for all sectors is expected to see a 13.8 percent increase in 2022, led by increased demand from the residential and electric power generation sector. Residential demand is expected to increase by 13 percent.
- Residential **propane** prices beginning in October 2022 averaged \$2.47/gallon, an increase of 8 cents (3.3 percent) compared to last year.
- No. 2 **heating oil** prices started the 2022/23 heating season \$1.29/gallon (41 percent) higher than last year at an average of \$4.40/gallon.
- **Electricity** demand is forecast to increase 1.5 percent in 2022. The largest growth is expected in the industrial sector (4.8 percent), with the commercial also up (0.9 percent) while residential (-0.3 percent) declines marginally. Residential electric rates edged up slightly, as customers of investor-owned utilities saw a median rate increase of 2.3 percent between October 2021 and October 2022.
- Average Midwest **gasoline** prices are expected to average \$3.89/gallon for 2022 and \$3.46 in 2023.

Data and Methodology

A vast majority of the predictive energy data (consumption, prices, and stocks) used in this appraisal's models are from EIA forecasts drawn from their Short-Term Energy Outlook (STEO). Energy supply and demand is often dependent upon weather-related variables. Therefore, variables such as heating and cooling degree days are also heavily used in the forecasts. Heating and cooling degree days are a commonly used metric for calculating building energy consumption. Deviations from "normal" degree day figures are helpful in understanding variations in consumption of energy commodities (see chart). Future degree day deviations cannot be known at the time



the appraisal forecasts are made, so assumptions are needed. For any model using degree day deviations, the assumption is made that future weather conditions will be approximately "normal" and there will be no deviations from the historical average degree day figure calculated by the National Climatic Data Center at that given point in time during the forecast period.

Monthly data is used for all forecasts in this appraisal. However, certain variables used in the appraisal models are only reported, or predicted, on a quarterly basis from their respective source. Quarterly data leaves data gaps in the monthly time series, therefore extrapolation tools are needed. A cubic spline interpolation tool, used for curve fitting, is employed to acquire the approximate monthly data points in between the quarterly figures that were available for use in the models.

The forecast models used for the Appraisal are, for the most part, derived from EIA forecast models used in their preparation of the STEO. More specifically, these forecast models are called ARIMA (Auto Regressive Integrated Moving Average) models. ARIMA models are an econometric tool used by analysts to better understand the relationship between variables, or to predict future points in a time series. The auto regressive and moving average portions of the model mean that past observations and past forecast errors are used in prediction of future observations. The integrated portion of the model means that a transformation was applied to the data for statistical purposes.

Forecast models are frequently evaluated and updated in order to provide as accurate information as possible so that future energy expectations can be built. However, given that the forecasting models used in this appraisal partly use predictions, extrapolated data, and assumptions of normal weather, the potential does exist for the forecasted value at a given point in time to vary from actual observed values for the same point in time.

Trending Topics

Electric Outage Compliance and Safety Regulations

On October 4, 2022 the MPSC ordered Consumers Energy Co. and DTE Electric Co. to report to the Commission on their compliance with regulations and past Commission orders governing utilities' response to outages and downed lines, and directed MPSC Staff to take action to begin a third-party audit and review of all equipment and operations of the two utilities' distribution systems. The Commission's steps in Case No. U-21305 come amid mounting frustration from the public and the MPSC with a pattern of widespread, lengthy outages from increasingly severe storms in Michigan.

Distributed Generation

Participation in Michigan's distributed energy program rose by 37% in 2021, according to the MPSC's annual distributed generation (DG) report. Participation has grown every year since 2006, and the report released November 14 found that the program added 3,709 new customers, with the total number of customers in the program at 14,262, with 14,446 DG installations. That's up from 10,553 customers and 10,718 installations in 2020.

Low Carbon Energy Infrastructure

The MPSC on September 30, 2022 issued a request for proposals (RFP) for Low-Carbon Energy Infrastructure Enhancement and Development Grants. Public Act 53 and Public Act 166 of 2022, approved by the Michigan Legislature and signed by Gov. Gretchen Whitmer, provide for a combined \$50 million in grants for businesses, nonprofit organizations and local governments to develop, acquire or build low-carbon energy facilities that may include natural gas, combined heat and power or renewable natural gas facilities as well as electrification programs.

Customer Assistance

Earlier this month, the MPSC unveiled its new energy assistance webpage designed to bring together, in one place, information and links to ways Michigan energy utility and telecommunications customers can find financial assistance to help them keep the lights and heat on and stay connected. The website, www.michigan.gov/mpsc/gethelp, includes information and links to state and utility company programs that offer energy bill assistance to income-qualified households, including State Emergency Relief, access to the Michigan Energy Assistance Program, and the annual Home Heating Credit, all of which provide financial assistance for families struggling with home energy costs. It also includes links to contact info for all of the natural gas and electric utilities whose rates are regulated by the MPSC.

Propane

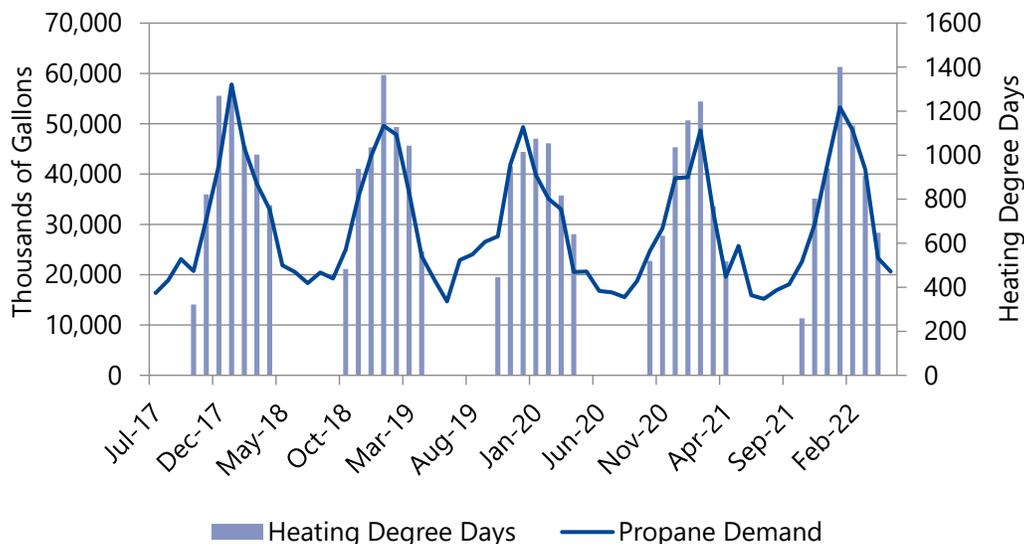
Demand

According to the EIA, about 5 percent of U.S. households heat with propane; however, in Michigan it is estimated to be a little more than 8 percent. Weather remains the largest determinant of propane use for residents. Heating degree day

(HDD) forecasts by the National Oceanic and Atmospheric Association (NOAA) indicate Michigan may experience slightly below normal temperatures throughout the 2022/23 winter heating season, totaling 5,341, 0.4 percent higher than the 1981-2010 normal of 5,321 HDD units.

Figure 1

Michigan Historical Propane Demand



Source: Energy Information Administration

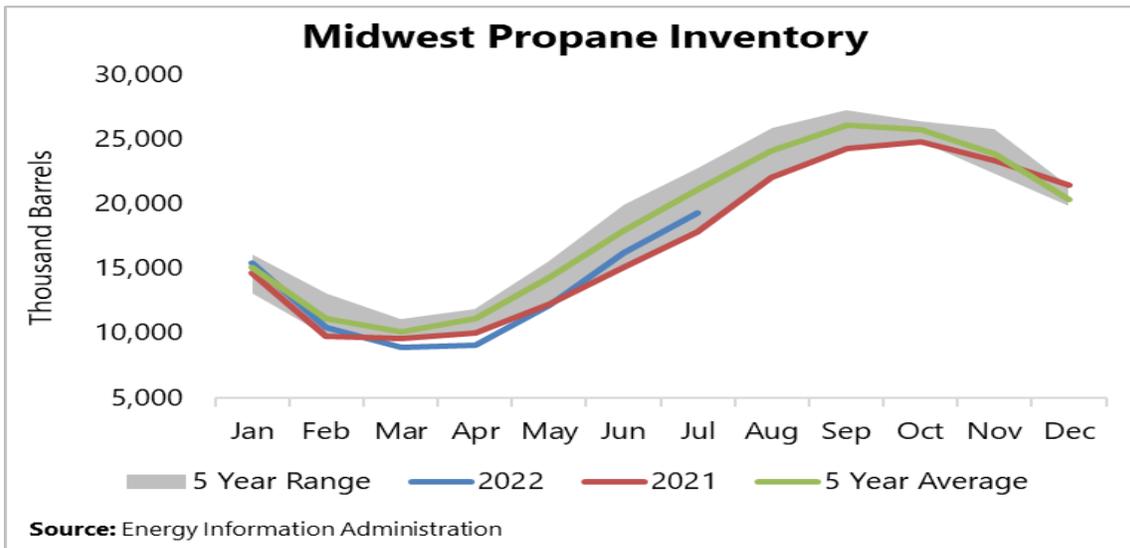
Another primary use for propane in the Midwest, including Michigan, is for the drying of harvested corn crops. When corn crops are planted late in the spring, or when the fall is especially wet, demand for propane from the agriculture sector may rise due to the increased need to dry down their crop for it to be stored without high risk of spoilage. As of October 11, 2022, many Midwestern states including Michigan, Iowa, Nebraska, Wisconsin, and Minnesota were showing corn maturity progress ahead of the five-year average – an indication there may be reduced propane demand for grain drying this fall.

Supply

U.S. propane production remains high – averaging 2.49 million b/d to begin October as propane export demand continues to be strong. The average Midwest propane production for the week ending November 4, 2022 was 521,000 b/d, an increase of 9 percent from the same period last year.

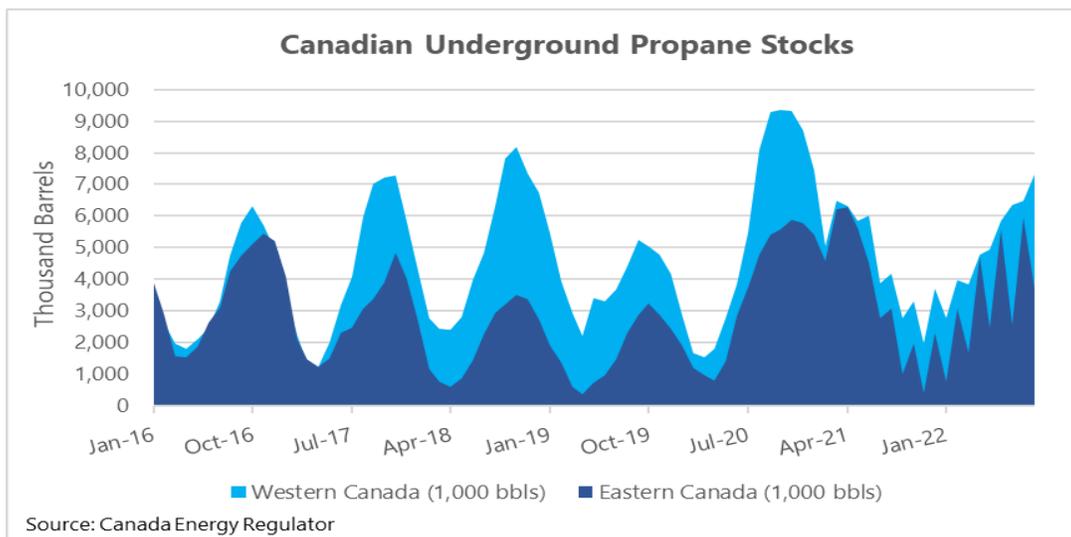
According to the EIA, U.S. inventories of propane and propylene stood at 87.7 million barrels as of November 4th, 17 percent above levels seen at the same time last year. PADD 2 (Midwest) propane and propylene stocks totaled 25.2 million barrels as of November 4 (up 88 thousand barrels from 2021), 3.2 percent below the five-year average for this time of the year.

Figure 2



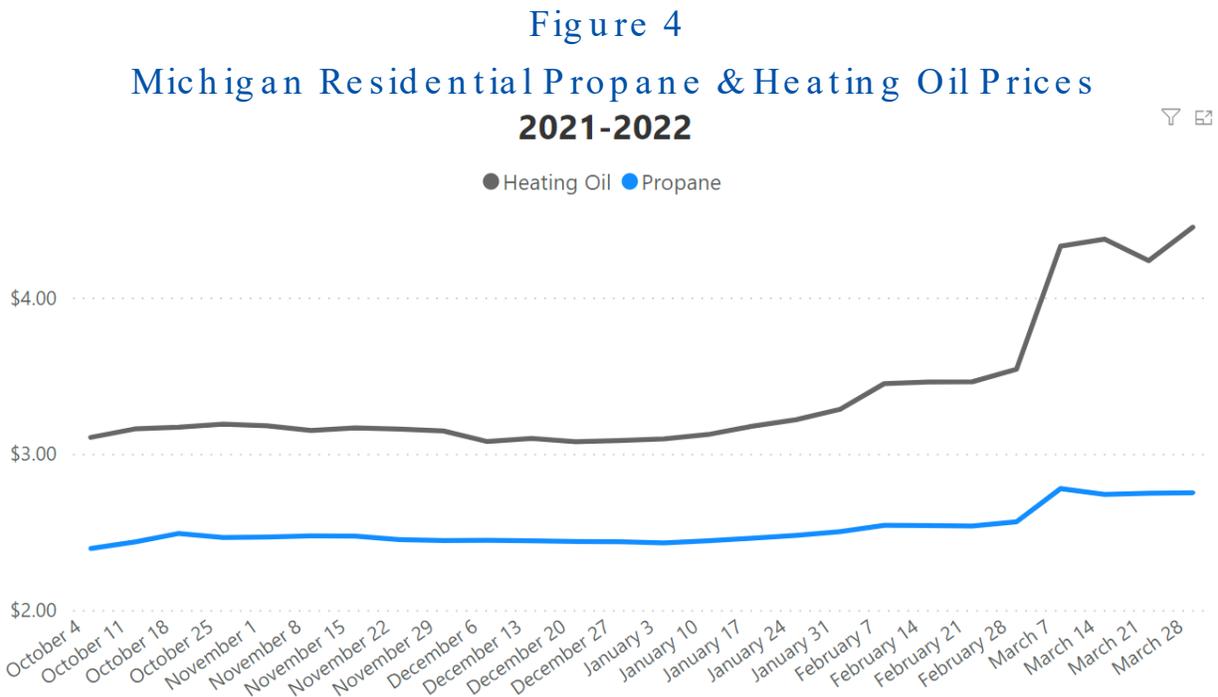
In addition to domestic propane supply, many regions of the U.S. rely on supplies from Canada that are transported by pipeline, rail, and truck. Major Canadian underground storage facilities are primarily located in western Canada (Alberta) and in eastern Canada (Ontario). According to the MPSC’s Statewide Energy Assessment, approximately 18.7 million barrels of underground cavern storage capacity for hydrocarbon gas liquids, such as propane, is located in Ontario near the Sarnia and Windsor areas. According to Canada Energy Regulator data, underground propane stocks to begin September totaled 4.04 million barrels in eastern Canada, and 7.5 million barrels in western Canada – 11.2 percent and 13.8 percent above five-year averages for the time period, respectively.

Figure 3



Price

According to the EIA, wholesale propane prices in Michigan started this heating season at \$1.10 per gallon (46 cents lower than prior year), an indication of a better supply situation. Higher oil and natural gas prices, which feed into propane prices, will likely lead to an increase in prices paid for propane this winter. For the week of November 7, 2022, the average residential propane price in Michigan was around \$2.49 per gallon.

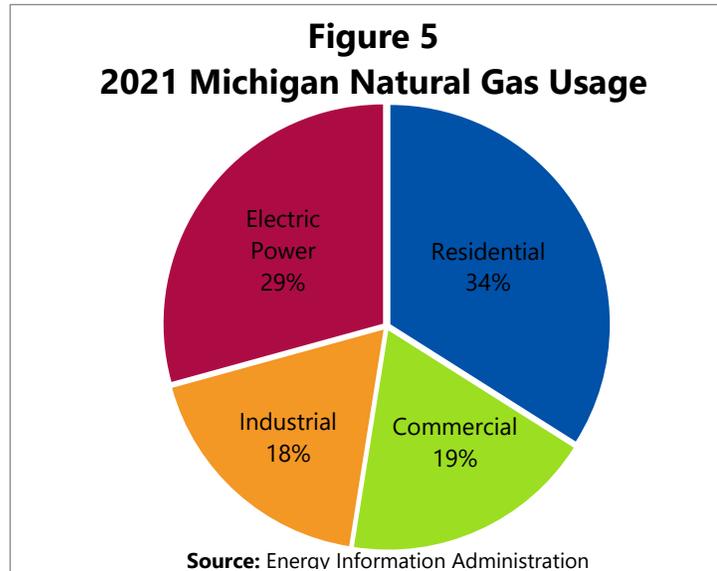


Source: https://www.michigan.gov/mpsc/0,9535,7-395-93308_93325_93424---,00.html

Natural Gas

Demand

Assuming normal winter weather through the 2022/23 heating season, total natural gas sales in Michigan from all sectors are projected to increase by 13.8 percent in 2022 to 991.4 billion cubic feet (Bcf). However, should Michigan experience a warmer than normal winter, usage for space heating could decrease and lower demand. Higher total natural gas sales for 2022 are driven primarily by an increase in demand from the residential and electric power generation sectors. The electric power generation sectors' consumption

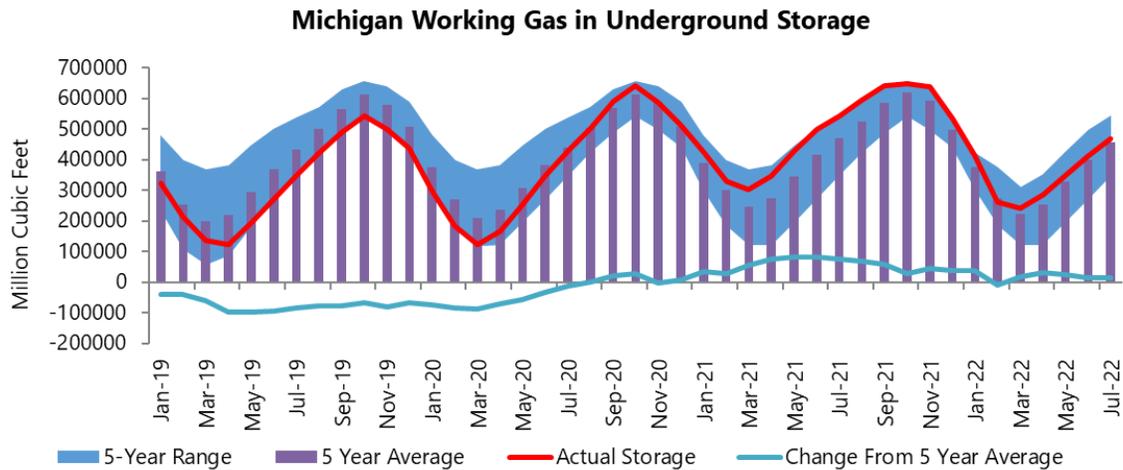


of natural gas is expected to grow 19.6 percent for 2022 – which is a significant rebound from the 9.6 percent decline seen in 2021 and largely reflects growth in electric demand from the state’s industrial sector. Michigan’s industrial production and manufacturing indices are expected to grow by 2 percent and 7 percent for 2022, respectively. Residential natural gas consumption – where it is used to heat about 77 percent of Michigan households – is estimated to rise by 13 percent due to a projected 12 percent increase in total heating degree days for the year.

Supply

Storage levels in Michigan are projected to be 448 Bcf to end 2022, which is 9.5 percent lower than the previous year’s end. Michigan has over 10 percent of the nation’s available underground storage capacity for natural gas, the largest of any state. Working gas storage inventories for the lower 48 states were 3,580 Bcf for the week ending November 4, 2022, 1 percent lower than the same time last year. Natural gas storage levels are normally at their lowest levels by the end of the heating season in March and are built up during the summer months. Storage injection typically begins after the end of the heating season and is sensitive to both current market prices as well as price expectations for the upcoming heating season. About 10% of Michigan’s natural gas needs are supplied via its own natural gas production wells. However, this production continues to slowly decline as the wells age and production decreases, becoming uneconomical.

Figure 6



Source: Energy Information Administration

Price

EIA forecasted residential natural gas prices for the Midwest this coming winter are noticeably higher than the previous winter at \$13.22/Mcf, a 29% increase. The wholesale price for winter '22-23 natural gas, determined by futures trading on the Chicago Mercantile Exchange (CME), averaged approximately \$7.65/Mcf (thousand cubic feet) this summer for the coming winter's future strip. The current prompt month of November is trading at an average price of \$5.92/Mcf demonstrating some expected easing of prices as winter approaches.

The EIA's November STEO projects Henry Hub natural gas spot prices to average \$6.05/Mcf for the 4th quarter 2022 with prices rising slightly to an average of \$6.68 for the deep winter months of January and February 2023. The EIA's projected prices reflect the current and projected tightness of supply and demand with producers unable to increase production enough to build excess storage levels. The LNG export markets remain strong in the U.S, with approximately 300 Bcf leaving the country in July of 2022. The usual seasonal demand increases and the growing LNG exports will draw down natural gas inventories and keep the market tight throughout the upcoming winter.

The total residential bill for natural gas service is comprised of the wholesale cost of gas purchased by Michigan utilities (Gas Cost Recovery (GCR) factor), the cost of interstate transport and delivery, the monthly customer charge, and the energy waste reduction surcharge used to implement energy efficiency programs. The projected weighted average commodity price (GCR factor/fuel cost alone) for residential customers of regulated utilities in Michigan during the November 2022 through March 2023 winter is currently \$6.98/Mcf compared to last year's actual average of \$4.75/Mcf.

Figure 7
Residential Natural Gas Bill Breakdown

	Cost Breakdown (per Mcf)			Customer Charge (monthly)	Nov. 2022 - March 2023 Bill Forecast
	Commodity Charge	Distribution	Total Average Cost		
Four Largest Gas Utilities	\$6.88	\$4.73	\$11.61	\$13.62	\$1,009

Note: commodity charge refers to the price of fuel based on October 2022 average; November 2022 - March 2023 usage is estimated at 81 Mcf.

Figure 8

**Michigan Natural Gas Demand
(Billion Cubic Feet--BCF)**

		Total Demand	Residential Demand	Commercial Demand	Industrial Demand	Electric Power Demand
Historical	2019 Total	968.4	332.3	181.8	173.6	280.8
	2020 Total	901.1	304.2	160.5	154.1	282.3
	2021 Total	871.2	296.0	161.4	158.6	255.1
	2022 January	146.4	68.3	31.9	18.7	27.5
	February	119.0	52.6	27.6	17.3	21.5
	March	102.3	41.3	22.5	17.4	21.1
	April	80.3	29.3	16.6	14.7	19.6
	May	48.3	10.2	8.2	11.9	18.1
	June	51.1	7.1	6.1	9.7	28.1
	July	58.7	6.1	5.4	10.8	36.4
Projection	August	57.7	6.7	5.6	11.0	34.3
	September	49.0	7.0	5.6	11.6	24.9
	October	65.9	17.4	9.9	13.5	25.1
	November	93.0	37.9	16.9	15.5	22.8
	December	119.6	50.7	25.2	18.1	25.6
	2022 Total	991.4	334.5	181.5	170.2	305.1
	2021-2022 change	13.8%	13.0%	12.5%	7.3%	19.6%
2023	January	146.7	65.6	30.2	20.2	30.8
	February	127.6	55.0	26.1	19.1	27.4
	March	111.2	42.0	22.4	18.3	28.5
	April	84.8	28.0	14.2	15.3	27.3
	May	60.3	12.3	8.4	12.7	26.9

NOTE: Projected sales are based on historical trends.

SOURCES: Historical Data – Energy Information Administration (EIA), U.S Department of Energy.

Projection by: MPSC, Energy Security Section, using primarily EIA data
(see methodology section for additional detail).

Distillate Fuels

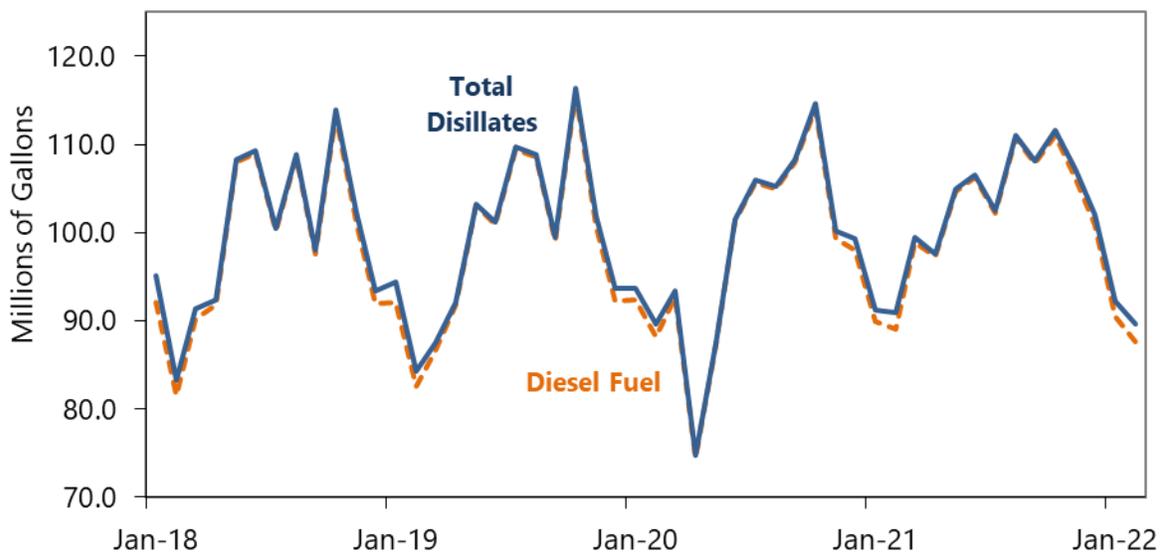
Demand

Ultra-low sulfur diesel fuel accounts for approximately 99% of total distillate demand, a majority being used for transportation by highway trucks, with the remainder consisting of heating oil, kerosene, and No. 1 distillate. Other users of distillates, although less prominent, include the agriculture, commercial, and industrial sectors, as well as vessel fueling.

Distillate fuels continue to decline as a primary fuel source for home heating in Michigan. According to estimates from the U.S. Census Bureau's American Community Survey, approximately 35,680 households heated their homes with the fuel in 2021 – compared to 76,879 households in 2010. Distillate fuel continues to be a prevalent home heating fuel source in areas of the Northeastern U.S.

Figure 9

Historical Michigan Distillate Fuel Oil Sales



Source: Historical data - Energy Information Administration

Supply

For the week ending November 4, 2022 national inventories of distillate oil were 106 million barrels, about 18 million barrels below this same time of last year and well below the five-year range. Midwest inventories for the same week totaled 24.5 million barrels, 4.6 million barrels lower than a year ago. While national production levels of distillates remain strong, lower year over year inventories are a result of increased demand and a robust export market. For the week ending October 7, national production of distillates totaled 4.86 million b/d, while exports averaged 1.27 million b/d – a year over year increase of 3 percent and 30 percent, respectively.

Price

Nationally, the EIA expects retail prices for on-highway diesel fuel will average \$5.08 per gallon for 2022, an increase of \$1.79/gallon from 2021. However, it is expected that distillate prices will pull back slightly for 2023, with prices estimated to average \$4.65 per gallon. According to AAA Michigan, the average price of diesel in Michigan was \$5.54 per gallon on November 15, \$2.00 per gallon higher than the price seen at this time last year.

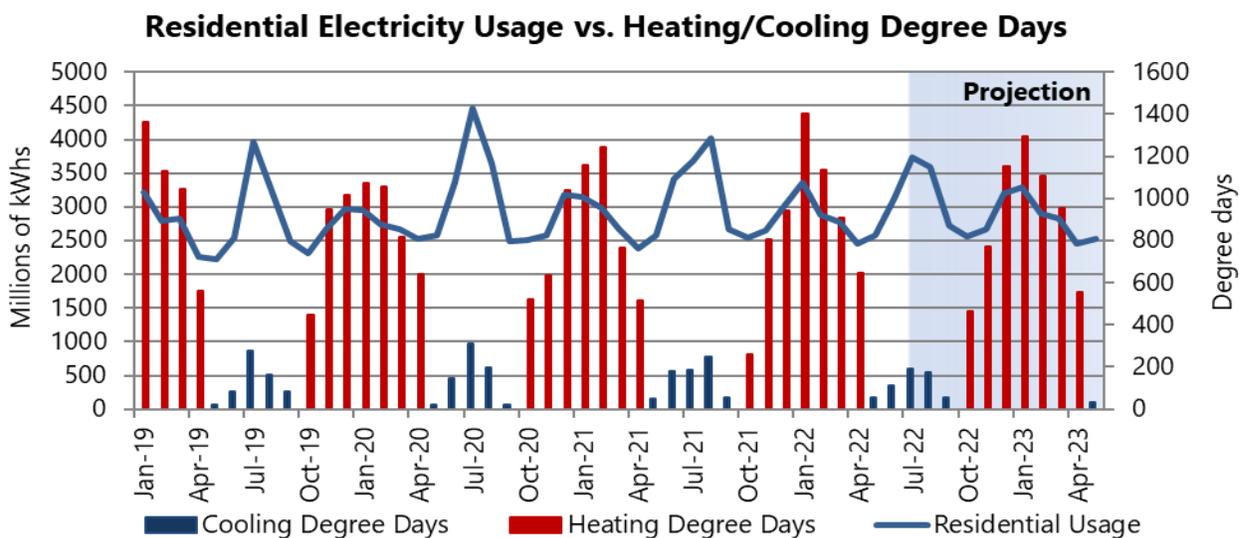
The average cost of No. 2 heating oil in Michigan was \$5.11 per gallon on November 7, 2022, \$1.96 per gallon higher than the cost at the same time last year. The principal price driver for heating oil is the U.S. refiner acquisition cost of crude oil, which averaged about 27 dollars more per barrel compared to the start of the 2021/22 heating season. Other factors affecting the price of heating oil include the seasonality of demand from weather conditions, competition in local markets, and regional operating costs.

Electricity

Demand

Assuming normal weather, Michigan's total electric sales for 2022 are projected to increase 1.5 percent to 100.89 terrawatt-hours TWh compared to 99.4 terrawatt-hours TWh in 2021. The increase in sales is expected to come from the industrial (4.8%) and commercial (0.9%) sectors. Residential sector sales are expected to decline only slightly (-0.3%). Two of the primary drivers of electricity consumption in the residential market is for cooling during hot weather and home heating during the winter. Summer 2022 had only 4 percent more cooling degree days than historical averages – indicating a pretty close to normal summer. Industrial sector usage of electricity, which is less dependent on weather fluctuations and more highly correlated to economic activity, grew by 7% in 2021 and is expected to further grow by 4.8 percent for 2022.

Figure 10



Michigan's combined coincident peak electrical demand, for both the Consumers Energy and DTE Electric service areas this summer was 17,711 megawatts (MW). Consumers Energy's bundled peak electric demand this summer was 7,529 MW and occurred on June 21, 2022. DTE Electric's bundled peak demand was 10,182 MW and was also on June 21, 2022.

Supply

During the 2021 summer cooling season, neither DTE nor Consumers Energy had to interrupt service to their customers due to emergency operating conditions. Furthermore, no supply shortages or transmission constraints are expected to affect the ability of Michigan utilities to meet peak electric demand for this winter. In addition to power that they generate, Michigan utilities can purchase external electricity supply from wholesale markets administered by MISO and PJM as needed.

Price

Year-over-year changes in residential electrical bills can vary substantially from utility to utility, with some residents seeing their bills decrease while other bills increase. Residential bills in areas of the Central and Western Upper Peninsula, where population densities tend to be lower and the local power grid is challenged by various constraints imposed on and by the surrounding electrical generation and transmission systems, continue to be some of the highest in the state.

Figure 11
Michigan Electric Rate Comparison (October)

	2021		2022		Percent Change
	Monthly Bill	¢/kWh	Monthly Bill	¢/kWh	
INVESTOR OWNED					
AEP (I&M) Combined	\$86.00	17.20	\$86.05	17.21	0.1%
Alpena Power	\$68.75	13.75	\$68.27	13.65	-0.7%
Consumers Energy	\$93.30	18.66	\$91.71	18.34	-1.7%
DTE Electric	\$90.25	18.05	\$92.06	18.41	2.0%
Northern States Power	\$68.00	13.60	\$87.01	17.40	28.0%
UMERC - (FORMERLY WEPCO)	\$74.85	14.97	\$108.09	21.62	44.4%
UMERC - (FORMERLY WPS)	\$67.70	13.54	\$107.07	21.41	58.2%
Upper Peninsula Power	\$111.55	22.31	\$114.42	22.88	2.6%
COOPERATIVE					
Alger Delta	\$102.42	20.48	\$102.40	20.48	0.0%
Cherryland	\$77.55	15.51	\$81.55	16.31	5.2%
Cloverland	\$70.48	14.10	\$73.48	14.70	4.3%
Great Lakes	\$88.11	17.62	\$94.00	18.80	6.7%
Homeworks Tri-County	\$90.44	18.09	\$98.75	19.75	9.2%
Midwest	\$95.60	19.12	\$108.92	21.78	13.9%
Presque Isle	\$77.39	15.48	\$87.68	17.54	13.3%
Thumb	\$82.01	16.40	\$82.01	16.40	0.0%

Note: Monthly Bill calculations are based on usage of 500 kWh/month and exclude state sales tax.

Figure 12

Michigan Electricity Sales

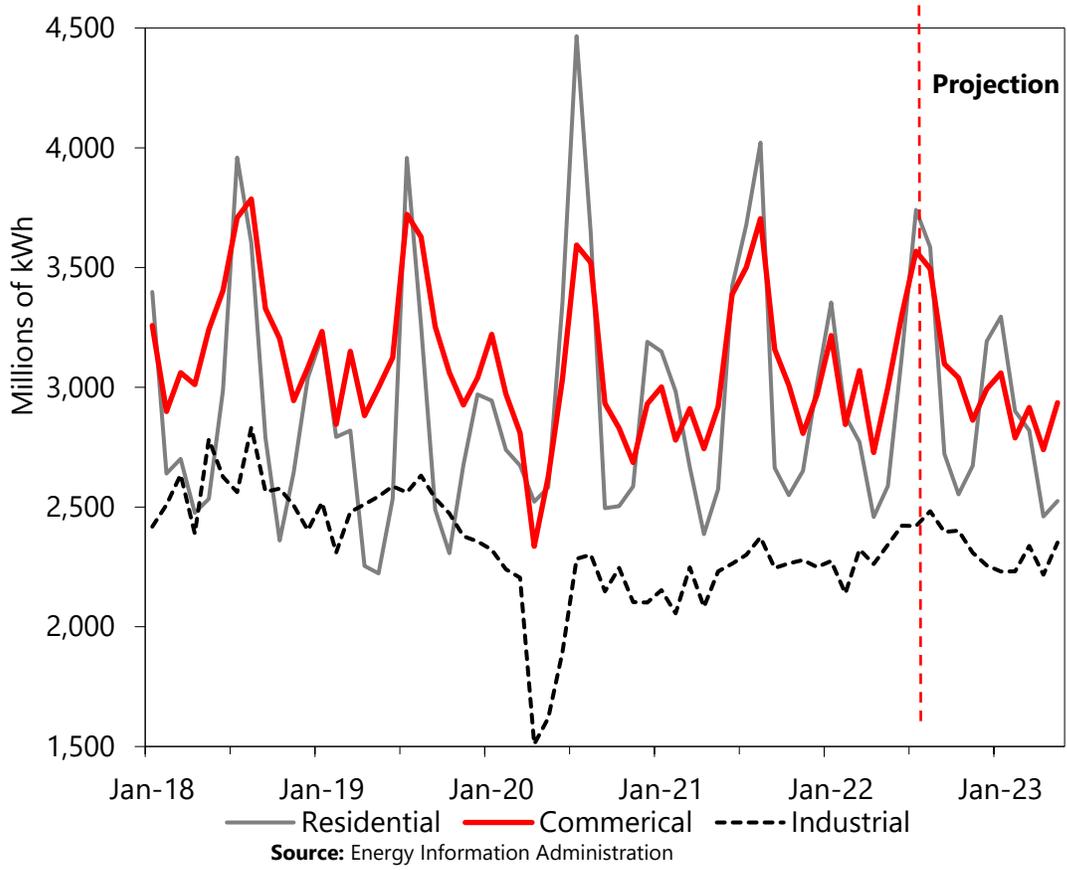


Figure 13

Michigan Electricity Sales Projection
(Millions of kWh)

			Residential	Commercial	Industrial	Total
Historical	2019	Total	33,496	37,862	29,886	101,244
	2020	Total	35,695	35,491	24,972	96,158
	2021	Total	35,764	36,891	26,745	99,400
	2022	January	3,354	3,216	2,275	8,844
		February	2,880	2,845	2,139	7,864
		March	2,771	3,070	2,323	8,164
		April	2,459	2,727	2,262	7,448
		May	2,588	2,999	2,342	7,929
		June	3,133	3,302	2,422	8,857
		July	3,741	3,568	2,420	9,729
Projection		August	3,584	3,495	2,483	9,562
		September	2,722	3,098	2,396	8,216
		October	2,553	3,039	2,402	7,993
		November	2,673	2,862	2,309	7,844
		December	3,192	2,992	2,256	8,441
		2022 Total	35,650	37,213	28,028	100,891
2021-2022 change			-0.3%	0.9%	4.8%	1.5%
	2023	January	3,295	3,060	2,231	8,585
		February	2,900	2,789	2,231	7,921
		March	2,820	2,916	2,337	8,073
		April	2,461	2,740	2,218	7,418
		May	2,525	2,936	2,352	7,813

NOTE: Projected electricity sales are based on historical trends.

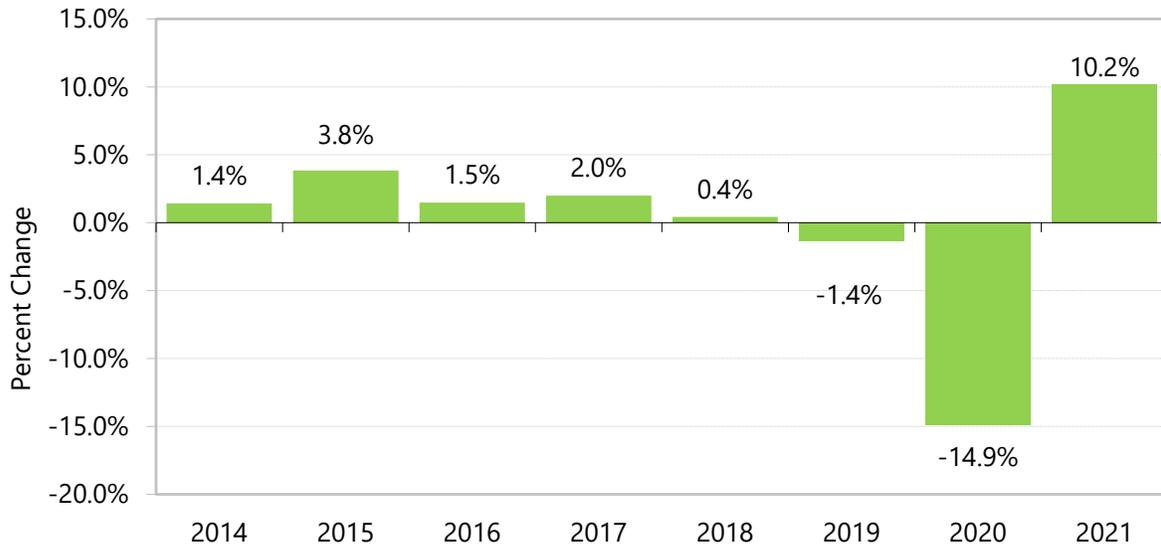
SOURCES: Historical Data – Energy Information Administration, U.S Department of Energy.

Projection: MPSC, Energy Security Section, using primarily EIA data
(see methodology section for additional detail).

Motor Gasoline Demand

Figure 13

Historical Michigan Gasoline Consumption



Source: Energy Information Administration

Supply

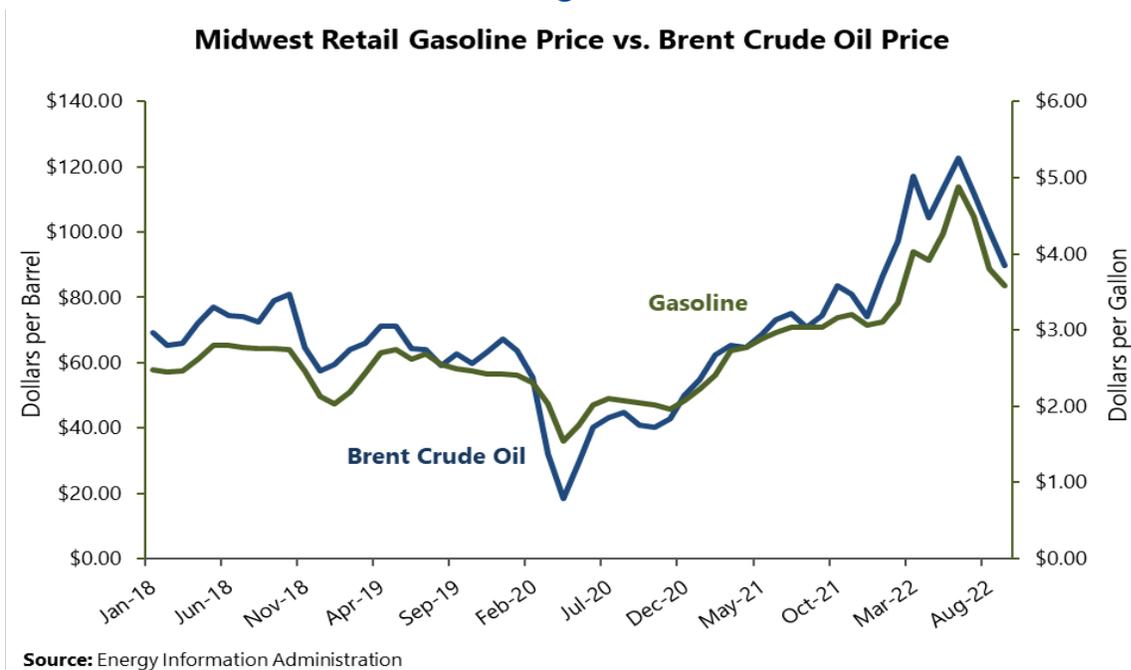
Refinery utilization rates for the Midwest averaged 91.4 percent throughout the summer driving season. As of November 4, the PADD 2 region¹ held 45 million barrels of gasoline inventories, 500 thousand barrels more than this same time last year. On a national level, gasoline inventories are 3.3 percent lower than last year and below the five-year range for this time of year.

Price

According to AAA Michigan, the average price for a gallon of regular unleaded gasoline in Michigan on November 15, 2022, was \$3.99 compared to \$3.40 a year ago. The EIA expects Midwest retail regular grade gasoline prices to average \$3.89/gal for 2022 and \$3.46/gal in 2023. Higher crude oil prices relative to last year are a driving factor for higher prices seen at the pump. The EIA projects Brent crude oil to average \$102/barrel for 2022, compared to only \$70.99/barrel seen in 2021.

¹ PADD 2 region comprised of Michigan, Ohio, Indiana, Kentucky, Tennessee, Illinois, Wisconsin, Missouri, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma.

Figure 14



Petroleum

U.S. Outlook

The EIA's November Short Term Energy Outlook (STEO) revised U.S. crude oil production figures downward slightly from just a month ago. U.S. crude oil production averaged 11.25 million b/d in 2021 and is expected to increase to 11.83 million b/d for 2022 and up to 12.31 million b/d in 2023. The price for WTI began to steeply increase in 2022, rising from \$83/barrel in January to a high of \$114/barrel in June. A major contributing factor to the rising prices in 2021 and into 2022 was the backwardation of crude oil markets. Backwardation in a market occurs when nearer futures contracts command a higher price than longer dated contracts. This behavior typically arises when the market is undersupplied in the near term, which then acts to drive up prices. As of the week ending November 4, 2022, the futures market for light sweet crude oil at Cushing, OK was still in backwardation, with the prompt month at \$87.03/barrel and \$83.38/barrel for February 2023.

U.S. crude oil stocks currently reside 5.7 million barrels higher than a year ago. As of November 4, 2022, the U.S. had 440.8 million barrels in inventory (1.3% increase relative to 2021) which stands near the middle of the five-year range for this time of year. U.S. crude oil exports have declined recently, with the weekly average ending November 4, 2022, standing at 3.52 million barrels per day – down from this year's high of 5 million b/d in August.

Figure 15

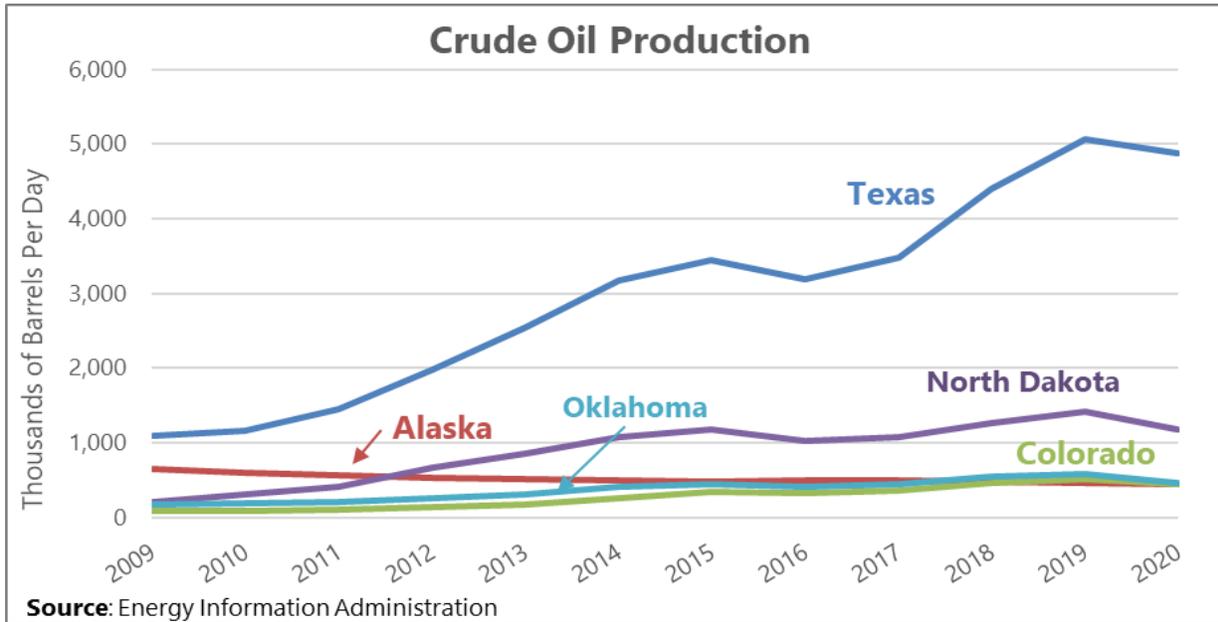
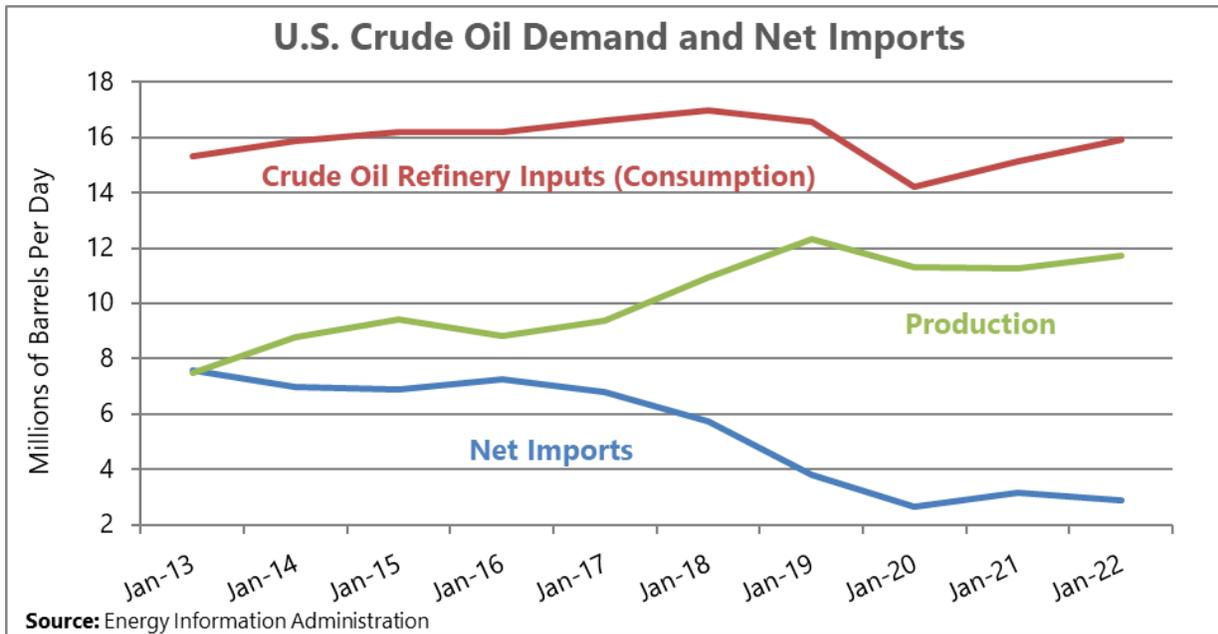


Figure 16



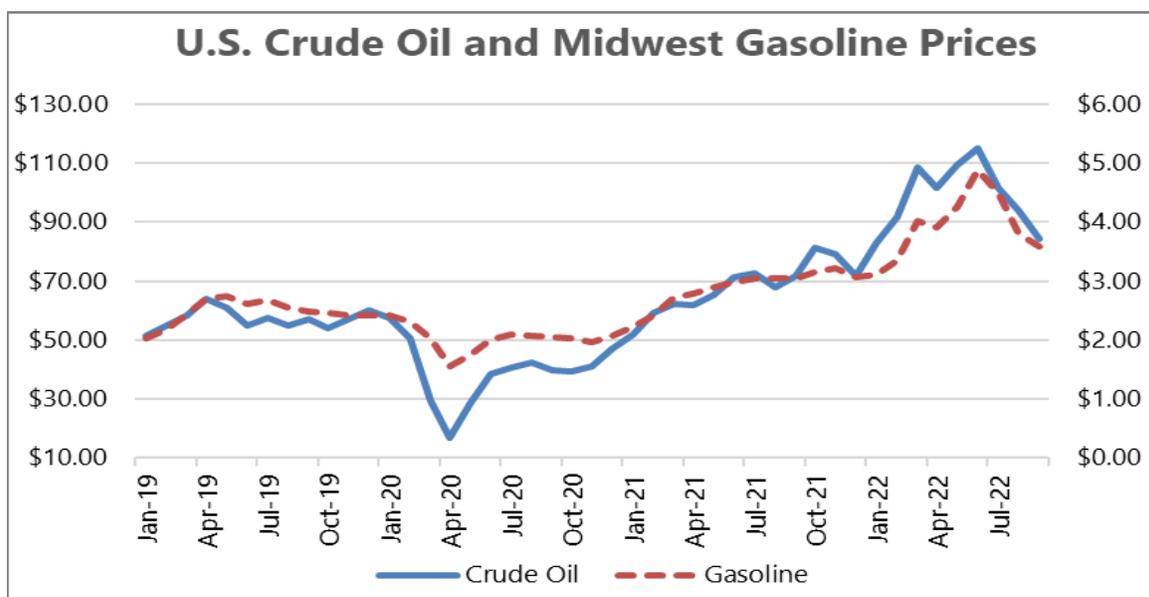
World Outlook

The EIA November STEO reports that global petroleum consumption will increase by 2.26 million b/d in 2022 and again rise by 1.16 million b/d in 2023. The increase for 2022 is attributed to both non-Organization for Economic Cooperation and Development (OECD) nations, as well as more developed regions. The last time global petroleum consumption declined on an annual basis was in 2020 due to the impacts of the COVID-19 pandemic; and before that in 2009 due to the 2007-08 Financial Crisis.

Global petroleum production and supply is expected to rise by 4.24 million b/d in 2022 and further grow 0.74 million b/d in 2023. The 2022 consumption and production projections demonstrate why oil prices are expected to ease in 2023. When global supply growth outpaces consumption, the result will be an increase in global crude oil inventories and subsequent weakening in prices. In October, the Organization of Petroleum Exporting Countries (OPEC) and non-member Russia announced they had agreed to decrease output by 2 million b/d. However, the cut in production is expected to be closer to 1 million b/d due to some member countries not meeting their expected quota.

EIA projects that West Texas Intermediate (WTI) crude oil will average \$95.88/bbl for 2022 and \$89.33/bbl in 2023. The Brent (North Sea) crude oil spot price is forecast to average \$102.13/bbl and \$95.33/bbl, respectively. WTI and Brent are light sweet crudes used as international benchmarks in spot market pricing. The price of crude oil is closely tied to that of gasoline, as seen in the graph below.

Figure 17



Sources: U.S. Energy Information Administration, Short-Term Energy Outlook October 2022.
 Note: Gasoline prices are for regular unleaded, including taxes.

Michigan Household Winter Heating Fuel Summary

The Winter Heating Fuel Summary depicts what a typical Michigan household is projected to consume and spend on their primary heating fuel during the 2022-2023 winter heating season. Actual usage for any given home will depend on a number of factors, including the relative energy efficiency of the home, the home's location and size, the occupants' individual heating preferences, and the number of heating units or appliances in the home.

Residential natural gas expenditures are expected to increase by \$274 compared to last winter’s projection, due to higher commodity prices for natural gas. Accordingly, the Winter Heating Fuel Summary assumes that current fuel prices will continue to

Michigan Household Winter Heating Fuel Summary
2022-2023 Projected Residential Heating Season Expenditures¹

	<i>Weather Normalized</i>		
	10% Below	Midpoint	10% Above
Natural Gas			
Consumption (Mcf)	73	81	89
Avg. Price (\$/Mcf)	\$10.60	\$11.78	\$12.96
Expenditures (\$)	\$834	\$1,014	\$1,213
Heating Oil			
Consumption (gallons)	370	418	460
Avg. Price (\$/gallon)	\$3.96	\$4.40	\$4.84
Expenditures (\$)	\$1,465	\$1,839	\$2,226
Propane			
Consumption (gallons)	581	645	710
Avg. Price (\$/gallon)	\$2.22	\$2.47	\$2.72
Expenditures (\$)	\$1,290	\$1,593	\$1,928

¹ Projections assume normal weather. Consumption, pricing, and expenditure data pertain to the winter heating season, which runs from November through March. Natural Gas prices are based on the October average rates for Michigan gas utilities, including distribution, customer charge and the cost of gas. Heating oil and propane prices are based on the residential price in Michigan for the first week of October. All prices are assumed to hold constant over the winter. Projected usage is based on EIA and MPSC data and calculations from MPSC staff.

hold steady throughout the winter, but acknowledges that these prices are often volatile, and can change rapidly as dynamic supply and demand conditions are impacted by severe weather, infrastructure failures, geopolitical instability, and other issues.

Prices for heating oil and propane have started the 2022/23 winter heating season above levels seen last year due to higher crude oil prices and lower stocks at the national level. Winter expenditures for propane and heating oil are projected to increase by \$75 and \$543 respectively compared to what was projected a year ago using the first week of October average prices.

Should this season’s winter temperatures deviate from historical norms, the National Oceanic and Atmospheric Administration (NOAA) anticipates that it may do so toward colder temperatures, this could further raise heating costs for Michigan households.

Conclusion

As the winter heating season begins, residents should expect energy supplies to be readily available to meet their needs. Michigan’s energy systems remain robust and are well positioned to meet the evolving needs of consumers in the state. MPSC Staff will continue their work to ensure this robustness and remain watchful for the ever-present risks to the state’s energy systems.